REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	28 Feb 2002	Final Report 6 Jun 2001 to 30 Sept 2001

4. TITLE AND SUBTITLE
A Research and Analysis of Amcom, RDEC, ED, Production Engineering Division and the Systems Engineering Effort

5. FUNDING NUMBERS
DAAH01-01-C-R160
Option 0002AP

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8. PERFORMING ORGANIZATION REPORT NUMBER
5-21776

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The objective was to provide expertise in the areas of strategic planning, systems engineering, and facilitating effective communication techniques. Research and analysis of the strengths and weaknesses of the Production Engineering Division was conducted. A Skills Inventory List was generated to aid in developing a training/education program and to identify expertise and knowledge within PED. A systems survey was developed which included a loose assessment of the CMMI and given throughout the directorate. An analysis detailing the weaknesses and strengths of the systems engineering effort and where in the organization those strengths and weaknesses resided was conducted. A meeting was held to give a brief overview of Produciblity Engineering to PED personnel.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Systems Engineering Strategy	4
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

DAAH01-01-C-R160 Option 0002AP

DAO# _____

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256-824-6075
Telephone Number

Technical Report 5-21776
Contract No. DAAH01-01-C-R160
Delivery Order No. 005b

A Research and Analysis of AMCOM, RDEC, ED, Production Engineering Division and the Systems Engineering Effort

(5-21776)

Final Technical Report for Period
6 June 2001 through 30 September 2001

February 2002

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Prepared for:

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Redstone Arsenal, AL 35898
Attn.: Ms. Patti Martin

PREFACE

This technical report was prepared by the faculty of the Industrial and Systems Engineering and Engineering Management Department at the University of Alabama in Huntsville. The purpose of this report is to provide documentation of the work performed and results obtained under Delivery Order 005b of AMCOM Contract No. DAAH01-01-C-R160. Dr. Dawn R. Utley was the principal investigator. Ms. Patti Martin, Production Engineering Division, Engineering Directorate, Missile Research, Development and Engineering Center, provided technical guidance.

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation.

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Prepared for: Commander
U.S. Army Aviation & Missile Command
Redstone Arsenal, AL 35898

I have reviewed this report, dated February 2002, and the report contains no classified information.

Dawn R. Utley
Principal Investigator

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1.0 Introduction

The Engineering Directorate (ED) of the Aviation and Missile Research Development and Engineering Center (AMRDEC) provides systems engineering support to AMCOM aviation and missile weapons system project offices. This systems engineering function includes the areas of quality and production engineering.

The Directorate has seen many changes over the past five years in the merging of Aviations and Missile Commands and mergers between groups within the Directorate. The Directorate provides support to its customers in the areas of systems, quality, reliability, and production. As such, expert and updated knowledge in these technical areas and in engineering management principles is needed to facilitate the understanding and dissemination of this knowledge for the successfully accomplishment of the Directorate's goals.

2.0 Objective

The objective of this task is to provide expertise in the areas of strategic planning, systems engineering, and facilitating effective communication techniques. This task shall include aiding in the development of a strategic plan for the future of PE, assessing current capabilities and identifying future needs. Evaluation of the systems engineering effort within ED will be assessed according to established standards and procedures. And specific recommendations will be made.

3.0 Statement of Work

The statement of work, as outlined in delivery order 005b, was as follows:

3.1 Strategic Planning. The contractor shall investigate background information to assess the current of the Directorate and specifically PE. Such things as mission and vision statements review, internal and external environment assessment, and future needs of customers and the supporting Directorate will be used to help establish a strategic plan for PE specifically. Interviews with key AMCOM personnel and a possible survey developed and administered to assess the skill level and mix within PE will be used as part of the assessment.

3.2 Systems Survey results from a previous endeavor will be used to map requirements to independent standards such as EAI and CMMI. Benchmarking of other government facilities offering similar support as ED along with the analysis mapping will be used to identify strengths and weaknesses within the Directorate Development of specific recommendations will result from this study.

3.3 Seminar meetings will be conducted for the purpose of sharing information with the employees of PE. This information is intended to be timely and could include training in effective engineering management principals such as communication techniques. It might also include summary and recommendations of improvement efforts within the Directorate.

4.0 Conclusion and Recommendations

During the time frame allocated by the delivery order, the researcher, with the cooperation of representatives from AMCOM Engineering Directorate, conducted research and analysis into the strengths and weaknesses of the Production Engineering Division (PED). Future customer opportunities were identified and competitor threats were assessed. The current strategic mission and vision was evaluated. As a result, a Skills Inventory List was generated to aid in developing a training/education program. This list would also be valuable for new employee orientation to be used to identify expertise and knowledge within PED.

A systems survey was developed with the help of key Systems Engineers within PED on a previous contract. The Carnegie-Mellon Capability Maturity Model Integration was loosely incorporated into the survey. The survey was distributed throughout PED and beyond to other organizations within ED that participated in the systems engineering mission. A formal report detailing the weaknesses and strengths of the systems engineering effort and where in the organization those strengths and weaknesses resided was developed and submitted. This included an assessment with respect to the CMMI.

A meeting was held as part of the staff meeting to dissiminate information about the strategic endeavor and solicite suggestions and concerns. A breakfast meeting was held at which Dr. Componation from UAH gave a brief overview of Produciblity Engineering. Other short informative seminars have been discussed and will be scheduled as soon as time within the division permits.

Production Engineering Skills Inventory List

Name: _____

Please indicate your level of expertise with each of these concepts and tools, then indicate your formal training. The object is to evaluate current capabilities within PED and develop strategies for the future.

		Current Assessment				Have Had Formal Training
		None	Some Exposure	Moderate Experience	Very Proficient	
Concepts						
1	Facility Design and Layout					
2	Producibility Engineering					
3	Design for Manufacturing					
4	Materials Science					
5	Risk Management					
6	Optimization					
7	Modeling and Simulation					
8	Project Management					
9	Project Scheduling					
10	Statement of Work Devolpment					
11	Cost Analysis (Engineering Economy)					
12	Statistical Process Control					
13	Capability Maturity Model Standard					
14	ISO 9000 Standard					
15	Variability Reduction					
16	Writing Performance Specifications/Requirements					
17	Production Readiness Assessments					
18	Configuration Management					
19	Gov't Acquisition Process					
20	Gov't Contract Administration/Requirements					
21	Technical Readiness Assessment					
22	Understanding of PED Philosophy					
23	Business Process Reengineering					
24	Theory of Constraints					
25	Product Planning					
26	Process Planning					
27	Acquisition Strategy Devolpment					

		Frequency of Use or Proficiency				Had Formal Training
		None	Some	Moderate	Very High	
Self Management Skills						
28	Communication facilitator with customer					
29	Communication facilitator across divisions					
30	Communication facilitator across PED					
31	Understanding of capabilities within other divisions					
32	Time management					
33	Strategic view (futuristic vision)					
34	Organization skills (documenting accomplishments)					

		Frequency of Use or Proficiency				Had Formal Training
		None	Some	Moderate	Very High	
Self Management Skills (cont.)						
35	Leadership skills (experience as a team lead or manager)					
36	Marketing PED services					
37	Conflict resolution management					
38	Contract liaison					

		Current Assessment				Have Had Formal Training
		None	Some Exposure	Moderate Experience	Very Proficient	
Tools						
36	Quality Function Deployment					
37	Linear Programming					
38	Simplex method					
39	ARENA simulation package					
40	WITNESS simulation package					
41	PROMODEL simulation package					
42	CAD/CAM					
43	MICROSOFT PROJECT					
44	CPM					
45	PERT					
46	Trade off analysis					
47	Xbar and R charts					
48	n,p,c, and u charts					
49	Process capability					
50	Response Surface Modeling					
51	DoD guidelines in production engineering					
52	Life Cycle Analysis					
53	Flow Charts					
54	Affinity Diagrams					
55	Fault Tree Analysis					
56	Failure Modes and Effects Analysis					
57	Pareto Charts					
58	Ishikawa Diagram / Fishbone Diagram					
59	Matrix Diagram					
60	Relations Diagram					
61	Systematic Diagram					
62	Arrow Diagram					
63	Process Decision Program Chart					
64	MRP or MRP II					
65	Design of Experiments / Taguchi Methods					
66	DOORS or CORE					